SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY

SNOWY MOUNTAINS
HYDRO-ELECTRIC AUTHORITY

THE
SNOWY MOUNTAINS SCHEME

A National Engineering Landmark

National Engineering Landmark Plaque Unveiling
by
THE HON ALAN GRIFFITHS
Minister for Resources

16 August 1990

Tumut 3 Power Station, Talbingo NSW

NATIONAL ENGINEERING LANDMARK

In 1983 the Institution of Engineers, Australia, inaugurated the 'Australian Engineering Plaquing Program' to bring deserved public recognition to historic engineering works and sites. This program was developed by the National Panel on Engineering Heritage of the Institution on the basis of similar activities which have been operated successfully for many years by major engineering organisations, particularly in the USA.

There are two types of plaque. Many buildings, sites, exhibits and other engineering works are of historical significance and may be identified by an Historic Engineering Marker. Eleven of these ranging from the Stump Jump Plough to the Story Bridge (in Brisbane) had been recognised by the end of 1988.

For works of particularly outstanding engineering importance, the Institution reserves its ultimate accolade : The National Engineering Landmark (NEL).

NEL's are few in number and are only awarded after the most careful scrutiny. Nominations must be accompanied by thoroughly researched supporting documentation.

The Snowy Mountains Scheme joins the five only so far awarded:

- Newcastle Harbour
- Lennox's Landsdown Bridge (Sydney)
- Coolgardie Goldfields Water Supply (WA)
- Sydney Harbour Bridge (Sydney)
- Busbys Bore — Sydney's first water supply (Sydney)

The National Engineering Landmark plaque has been installed at Tumut 3 Power-Station, near Talbingo, NSW. Tumut 3 was completed in 1974 and is the most powerful of the Snowy Mountains Scheme's seven power-stations.

THE SNOWY MOUNTAINS SCHEME

The Snowy Mountains Scheme is a major Australian engineering feat. Its extensive construction phase began in 1949 and took 25 years to complete.

The more obvious features of the Scheme are seven power stations, a pumping station and 17 large dams. Less apparent are more than 80 kilometres of aqueducts and 145 kilometres of tunnels. The Scheme's major reservoirs have a total storage capacity of approximately 7 000 gigalitres.

The topography of the Snowy Mountains effectively creates two separate, but interconnected systems. The Snowy-Murray Development, which flows into the Murray River and the Snowy-Tumut Development, which flows inland to the Murrumbidgee.

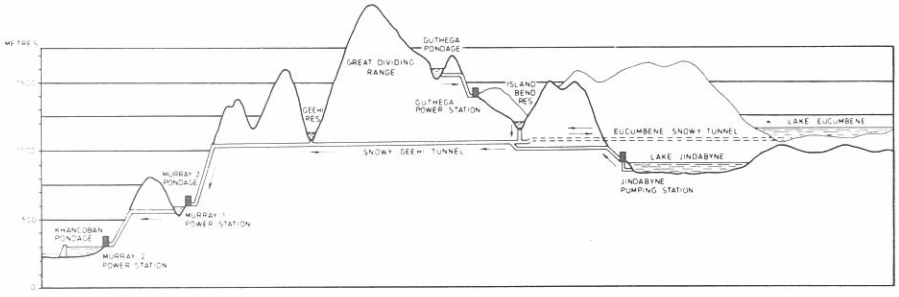
At the heart of the Snowy Scheme is Lake Eucumbene. With a capacity nine times the volume of Sydney Harbour this huge storage collects the head waters of the Snowy, Eucumbene and Murrumbidgee Rivers. These waters, together with those from other mountain rivers, are diverted through trans-mountain tunnels for the generation of hydro-electric power.

After release through the power stations the water flows on to the Murray and Murrumbidgee river systems for irrigation purposes in some of Australia's most intensive food production areas. An average of 2 360 GL of water is released annually to the two river systems from the storages of the Scheme.

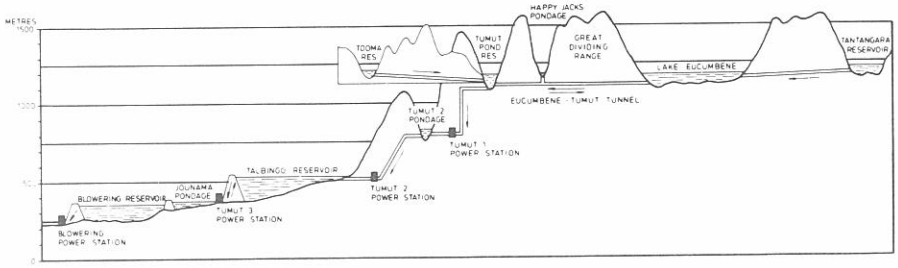
The Scheme's seven power stations have a generating capacity of 3 740 Megawatts. This represents 16.7% of total installed capacity for South Eastern Australia. The cost of the operation and maintenance of the Scheme is met by the electricity authorities of New South Wales, Victoria and the Australian Capital Territory. This includes repayment costs associated with the original Federal Government advances of $820 million and other, later, loans raised to make additional capital improvements.

The Scheme attracts a growing number of tourists each year. During 1989/90 four power stations and a pumping station were available for public inspection. As well as providing an opportunity to underline the Scheme's on-going role in modern Australia this action provided a boost for tourism in the Snowy Mountains area.

Snowy-Murray Development



Snowy-Tumut Development



THE SNOWY MOUNTAINS AUTHORITY

The Snowy Mountains Hydro-electric Authority which owns the Snowy Scheme was established by an Act of Parliament in July 1949 and is constituted by a Commissioner as a corporation sole with perpetual succession.

The Authority is responsible for water collection, diversion and storage and for the generation of electricity within the Snowy Mountains Area.

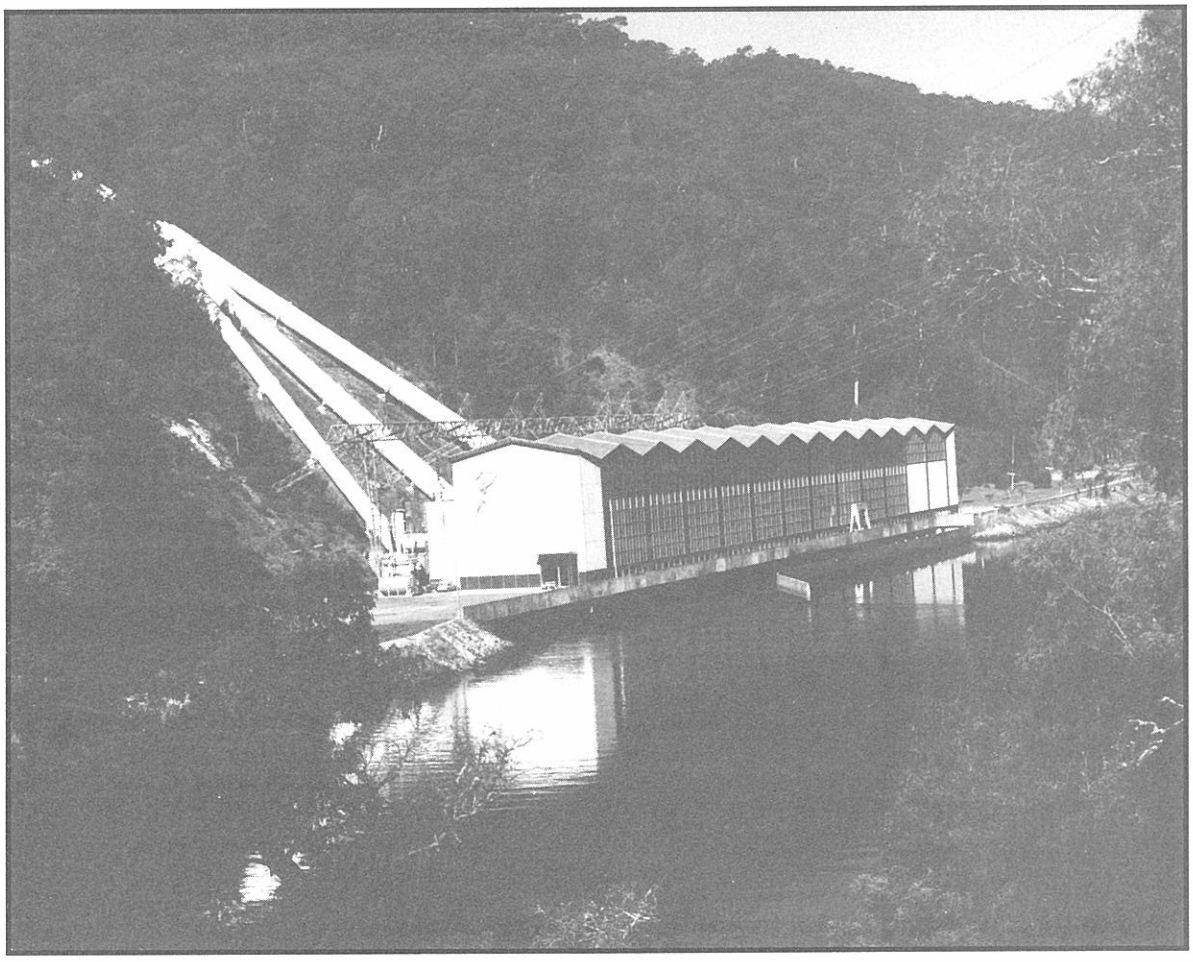
Electricity generated through the Scheme's seven power stations is supplied to New South Wales, Victoria and the Australian Capital Territory.

In addition, water released through the Scheme is provided — via the Murray and Murrumbidgee River systems — to the irrigation areas of Victoria and New South Wales.

For ease of administration and control the Authority has divided the Scheme into four areas: Upper Tumut, Lower Tumut, Murray and Kosciusko.

The Snowy Mountains Authority is a major employer within the Snowy Mountains area. Its personnel are based in the four regional areas and in Cooma, where the Authority has its Central Office.

The Authority works in close co-operation with the Snowy Mountains Council which was established by the Commonwealth, NSW and Victoria in the 1957 Agreement included as Schedule 1 to the Snowy Mountains Hydro-electric Power Act 1949. The Council includes representatives of the Commonwealth, participating States and the Authority.



Murray 2 Power Station near Khancoban

AN AUSTRALIAN VISION

Few achievements in Australia's history have matched the Snowy Scheme for vision and audacity. Construction began shortly after the ending of World War II and the Snowy in many ways represented a new start with a project which matched the post-war spirit and tapped the enthusiasm of the era.

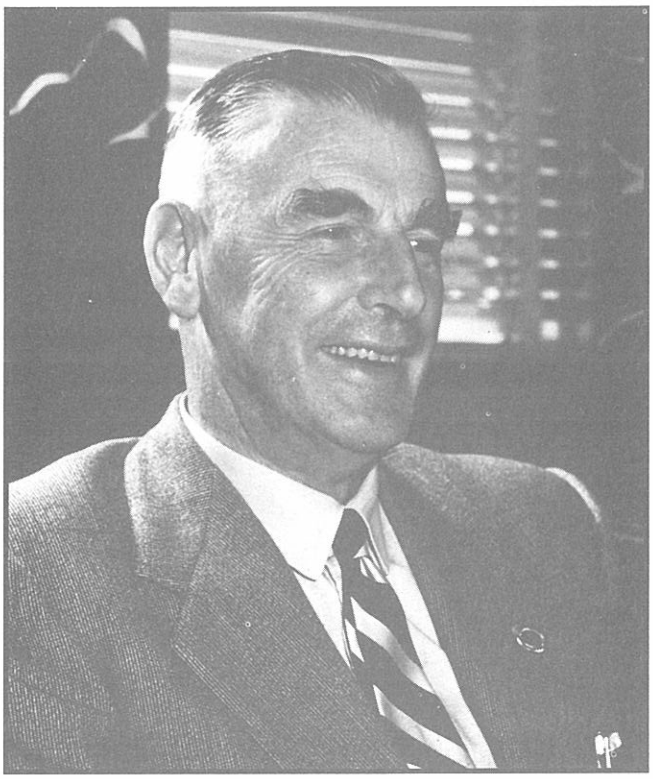
Although the collection of water from the Snowy Mountains had long been an Australian dream, the eventual construction was one that was shared by people from many lands. Construction of the Scheme began in October 1949 when the Governor-General, Sir William McKell, detonated a charge of explosive which started work on Lake Eucumbene.

In the 25 years of construction, until the completion of Tumut 3 Power Station in 1974, it is estimated that a total workforce of over 100 000 worked on the Snowy. In addition to the Authority's workforce many were employed by contractors and sub-contractors who carried out much of the work on the Scheme.

The Snowy Mountains Scheme is an important part of modern Australian history with a workforce which came from the four corners of the globe. Many of them migrated from post-war Europe to start a new life. People from over 30 countries worked on the Scheme and in the process helped shape a new direction in Australian society. Today's multi-cultural Australia owes much to the Snowy Scheme and the Scheme owes much to those who built it.

In 1989 the Snowy marked its 40th anniversary — 40 years of remarkable endeavour which have seen it more than meet the expectations of its backers. Today the Scheme is gearing up for its next 40 years of operation. In recent years a significant injection of technology has seen progressive changes in the way the Scheme conducts its operations and business.

A major programme to refurbish main generating plant is also underway. Unique in Australian history, the Snowy is proud of its achievements and is ready for the challenges of a new century in which the provision of pollution free energy and reliable irrigation water will be more important than ever.



Sir William Hudson...
the Authority's first Commissioner and
a principal architect for the Snowy Mountains Scheme

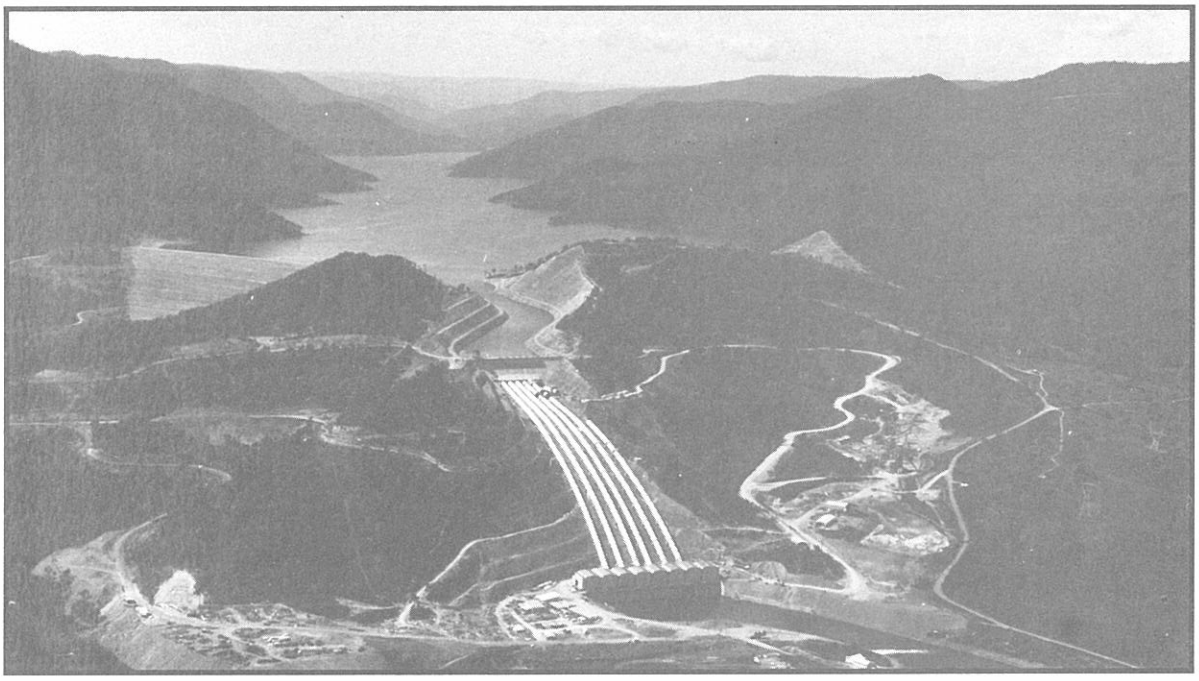
TUMUT 3 PROJECT

The Tumut 3 Project generates electricity using water discharged from Tumut 1 and Tumut 2 Power Stations, together with local stream inflows. Water discharged from Tumut 3 Power Station during peak-load periods can be held in Jounama Pondage and returned to Talbingo Reservoir during off-peak periods with three pumping units using off-peak thermal electricity from the New South Wales and Victorian Electricity Commissions.

The major works of the Project are:

- 161 m high rockfill Talbingo Dam
- 4 248 cumec capacity spillway channel
- 945 m long headrace channel
- 35 metre high concrete gravity intake structure
- six 488 m long pressure pipelines
- 1 500 MW Tumut 3 Power Station
- 44 m rockfill Jounama Dam

Tumut 3 Power Station nearing completion . Talbingo Reservoir in the background.



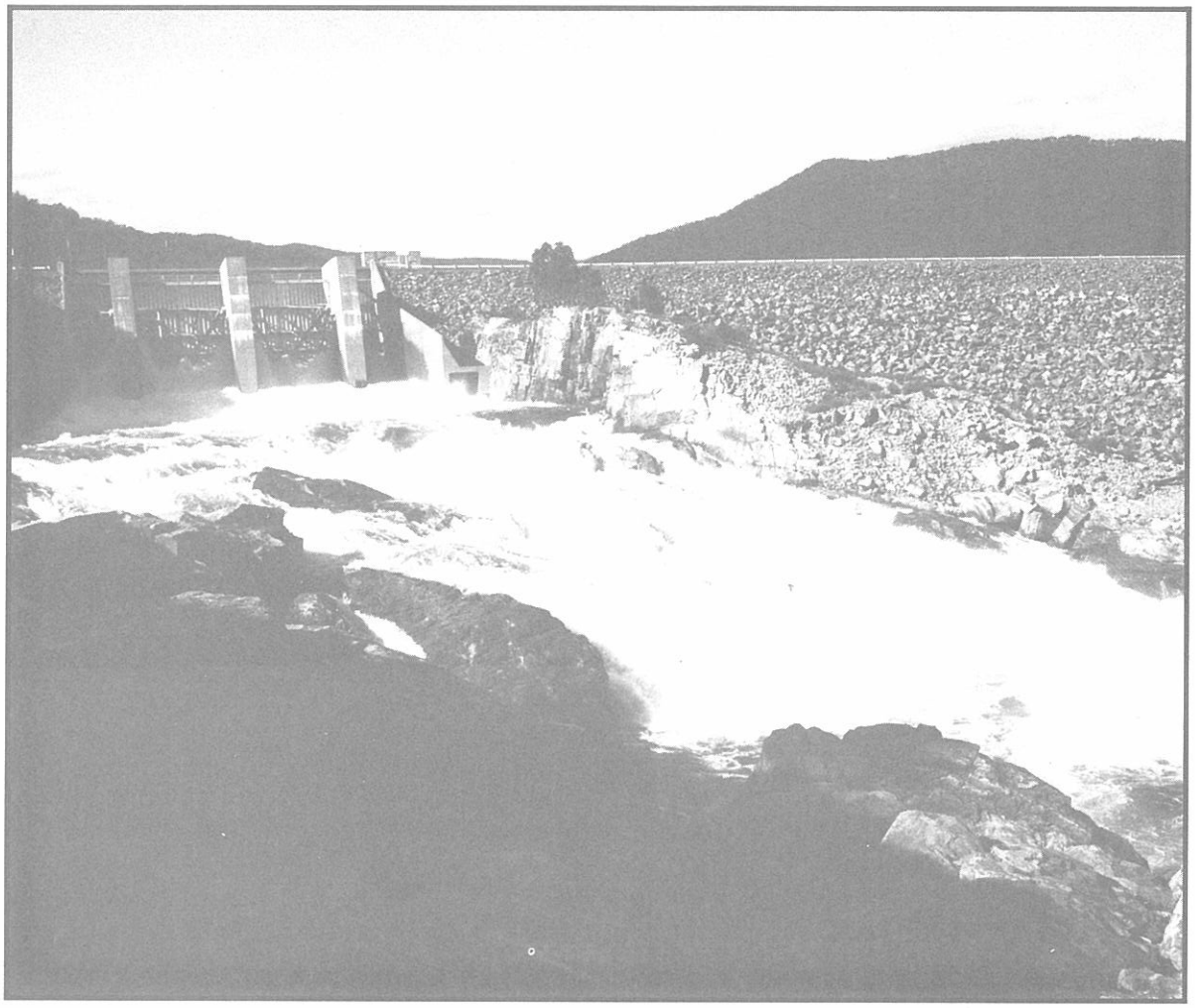
Tumut 3 Power Station

Tumut 3 Power Station houses six vertical shaft Francis-type turbines. Total discharge capacity of the six turbines is 1 133 m^3 of water per second. Each turbine is directly coupled to a 250 MW generator, giving the power station a total capacity of 1500 MW. The units rotate at 187.5 rpm and electricity is generated at 15 400 V with each pair of generators being connected to a bank of three single-phase transformers to raise the voltage to 330 000 V. The station became fully operational on 16 August 1974.

Three of the generators are designed to operate as motors after being started by the turbine. They then drive three large under-coupled pumps using power produced by thermal power stations during off-peak hours to return water from Jounama Pondage to Talbingo Reservoir. In this way, water can be made available for re-use through Tumut 3 Power Station during subsequent peak-load hours providing additional peak-load electricity when required by the States of New South Wales and Victoria.

The Power Station is connected to the Lower Tumut Switching Station nearby which, in turn, is connected to other switching stations of the Snowy Mountains Scheme or directly to the NSW State grid.

Jounama Dam and regulating gates near Talbingo



Talbingo Dam

Talbingo Dam provides the head storage for the operation of Tumut 3 Pumped Storage Project, collecting the waters discharged from the underground power stations of the Upper Tumut area, together with local inflows and the waters pumped back from Jounama Pondage.

Talbingo Dam is a rockfill structure with a sloping earth core, 161 m high and containing 14.5 million m^3 of material. The crest length of the dam is 701 m and the thickness of the base is 610 m. The reservoir formed by the dam has a total storage capacity of 921 GL and an active storage of 160 GL. At full supply level, the reservoir covers some 1 943 ha in area.

Tumut 3 Inlet Structure

Tumut 3 pipeline inlet structure provides the intake for Tumut 3 Power Station pressure pipelines. It is a concrete gravity structure 35 m high, with a base width of 33 m and a crest length of 138 m.

TUMUT 3 POWER STATION

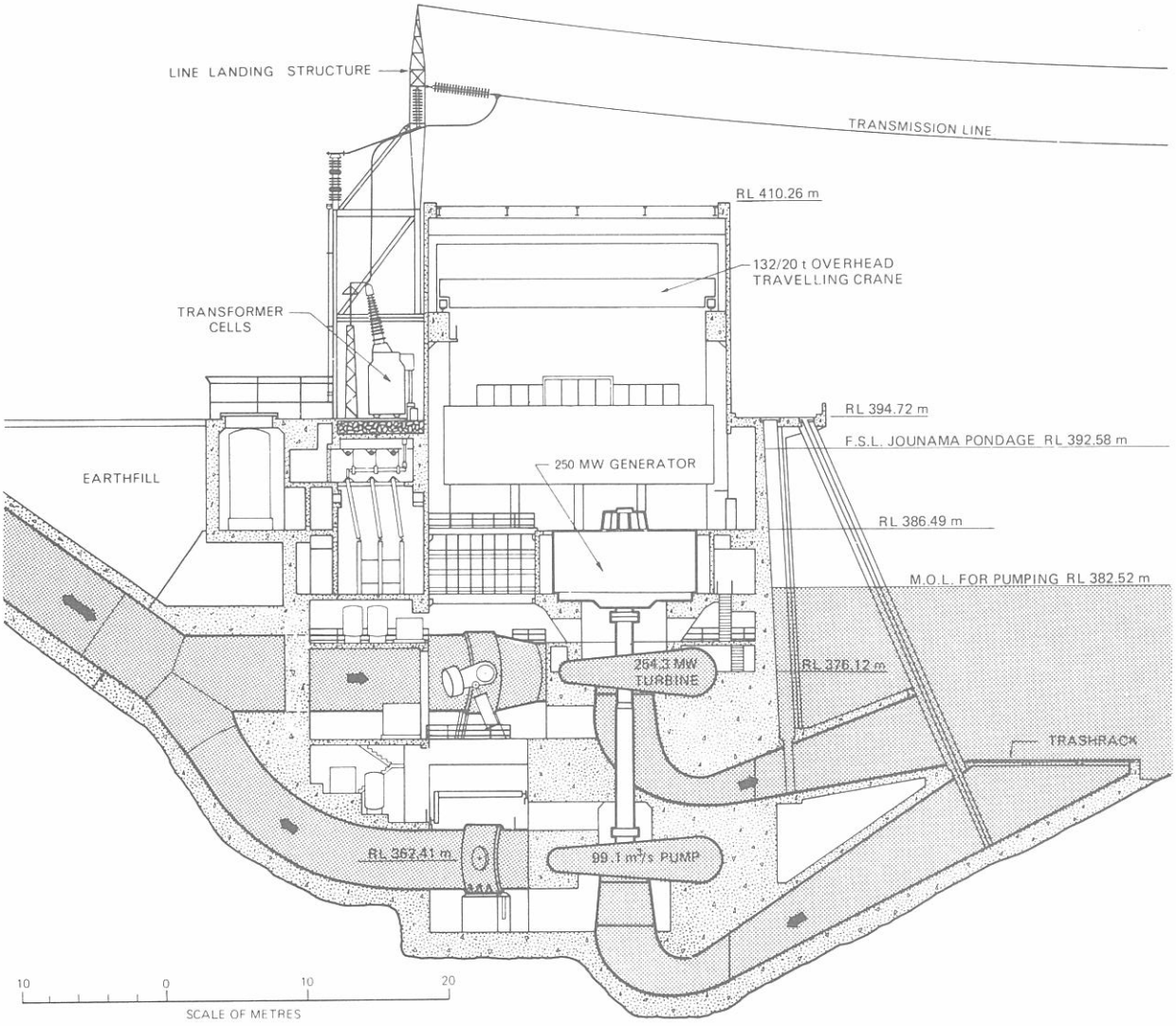
Function: Tumut 3 Power Station generates electricity from the waters provided from Talbingo Reservoir. Additional flexibility is achieved by pumps in the power station which return water to Talbingo Reservoir during off-peak periods.

Type: Concrete surface station

Generating Capacity: Six 250 000 kW units — total 1 500 000 kW

Machine Hall: Length: 154.23 m
Width: 22.48 m
Height: 59.61 m

Volume of Concrete: 85 600 m^3



Generators: Six vertical shaft, salient pole, 15.4 kV, semi-umbrella; three are designed to operate as motors after being started by the turbine. Each generator 250 MW at 0.95 power factor lagging

Pumps: Three pumps each with a capacity of 99.1 m^3/s against a pumping head of 155.1 m

Turbines: Six vertical shaft, Francis type, 254.3 MW at 187.5 r/min with rated head of 150.9 m. Total discharge capacity of 1 132.7 m^3/s

Transformers: Ten single-phase, oil-filled, water-cooled, 176/88/88 MV.A, $\frac{346}{\sqrt{3}}/15.4/15.4$ kV, four of which are adapted to operate generators as motors

Geology: Founded on rhyolite bedrock

Other Features: Line landing structures extending 14.6 m above power station roof

Construction Period: January 1968 to September 1973

SNOWY MOUNTAINS AREA ROAD MAP